NEW ENGLAND BIOASSAY, INC.

23 August 2010

Mr. Arthur Powers
Exxon Mobil Pipeline Company
Everett Distribution Terminal
52 Beacham Street
Everett, MA 02149

Dear Mr. Powers:

**ACUTE TOXICITY TEST REPORT TO
EXXON MOBIL PIPELINE COMPANY
FOR TANK NO. 140 - FIRST RAINFALL
(OUTFALL 001A) (COLLECTION DATE: 5 AUGUST 2010)**

This report contains results of one static-acute definitive toxicity test performed with the mysid, *Mysidopsis bahia*, using a sample (Outfall 001A) collected on 5 August 2010 by Exxon Mobil Pipeline Company staff from Tank No. 140 at the Exxon Mobil facility in Everett, MA. This report details the biological and chemical evaluations associated with performance of the acute toxicity test with the sample from Tank No. 140.

SAMPLE COLLECTION AND HANDLING

A grab sample was collected on 5 August 2010 by Exxon Mobil subcontractor, Triumvirate, from Tank No. 140 at the Exxon Mobil facility in Everett, MA (Table 1). The sample was to New England Bioassay (NEB) by Triumvirate personnel on 6 August at 1107 h. A copy of the chain of custody documentation is provided in Appendix A.

Upon receipt, standard wet chemistry analyses [pH, dissolved oxygen, specific conductivity, salinity, total residual chlorine (TRC), hardness, and alkalinity] were performed on the Tank 140 first rainfall sample (Table 2). On 6 August, an aliquot of the sample was warmed to the test temperature (25° ± 2°C) and solutions for the mysid toxicity test were prepared. Because the initial salinity of the first rainfall sample from Tank No. 140 was < 1 ppt, the salinity of the sample was adjusted before testing to 25 ± 2 ppt by the addition of Instant Ocean artificial sea salts to the Tank 140 first rainfall sample.

TABLE 1.

DESCRIPTION OF A SAMPLE COLLECTED FROM THE EXXON MOBIL PIPELINE COMPANY DURING AUGUST 2010 FOR ACUTE TOXICITY TESTING

Sample Description	Sample Date (Time)	Sample Type	NEB ID No.
Tank 140 First Rainfall Outfall 001A	08/05/10 (1400 h)	Grab	C30-2080

TABLE 2.

INITIAL WET CHEMISTRY RESULTS FOR A TANK NO. 140 FIRST RAINFALL SAMPLE - OUTFALL 001A

Analysis Performed	Tank No. 140 First Rainfall Sample
pH (SU)	7.7
Dissolved oxygen (mg/L)	7.7
Sp. Conductivity (µmhos/cm)	1440
Salinity (ppt)	< 1
TRC (mg/L)	0.047
Hardness (mg/L as $CaCO_3$)	240
Alkalinity (mg/L as $CaCO_3$)	215
Color	Yellow

TEST METHODS

Test procedures (Appendix B) were performed in accordance with the EPA guidance document titled "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms" (EPA/600/4-90/027F, 1993 & EPA-821-R-02-012, 2002) and EPA New England (Region 1) Modified Methods.

The test species was the mysid, *Mysidopsis bahia* (age: 2 days old at test initiation) obtained from in-house cultures. The definitive LC_{50} test consisted of five successive dilutions (i.e., 6.25, 12.5, 25, 50, and 100% wastewater) of the Tank 140 sample being evaluated for acute toxicity to *M. bahia*. Each concentration in the definitive test consisted of four replicates with 10 animals per replicate (40 animals per concentration); test volume per replicate was 200 mL. The mean test temperature and all individual temperature readings were 25° ± 1°C. Photoperiod was 16-h light and 8-h dark.

Natural seawater collected from Narragansett Bay (Narragansett, RI) by NEB personnel was used as dilution and control water. An aliquot of the natural saltwater used as diluent was submitted to Test America in Nashville, TN for analytical parameters specified by Exxon Mobil. Artificial seawater prepared from Instant Ocean sea salts was used as an additional quality-control check. The 48-h acute definitive test with the Tank No. 140 first rainfall sample collected on 5 August 2010 was performed during 6-8 August 2010.

To verify sensitivity of in-house cultured test organisms, a reference toxicant test using sodium dodecyl sulfate (SDS) was conducted during August 2010 with NEB's in-house cultures of *M. bahia* (test dates: 5-7 August 2010).

STATISTICAL ANALYSIS

Test data were analyzed for acute effects by determining median lethal concentrations (LC_{50}) and the acute no-observed-effect concentration (A-NOEC). The LC_{50} is the statistically-estimated wastewater concentration which is lethal to 50% of the test organisms at the time of observation (e.g., 24 h or 48 h); the A-NOEC is the highest wastewater concentration at which there is no statistically-significant effect on the survival of the test organisms when compared with diluent control survival at the time of observation (e.g., 24 h or 48 h). LC_{50} values were determined by using a computer package provided by the State of Connecticut Department of Environmental Protection (CTDEP). The A-NOEC was determined by using Steel's many-one rank or Fisher's exact tests.

RESULTS

Tank #140
Collection Date: 5 August 2010

Results of the acute toxicity test with *M. bahia* indicated that the sample collected from Tank No. 140 on 5 August 2010 exhibited no significant acute toxicity (Steel's many – one rank test; $P > 0.05$) to mysids in the 6.25% to 100% test concentrations when compared with mysid survival in the diluent control (100% at test completion) (Tables 3 and 4). At test completion (48 h), survival of mysids in the 6.25% to 100% wastewater concentrations was ≥ 90%. Survival of mysids in the artificial saltwater control was 100% at test completion. The 48-h LC_{50} for the mysid test was > 100% sample; the survival A-NOEC for mysids was 100% sample (Table 3).

Reference Toxicant Test

A reference toxicant test using sodium dodecyl sulfate (SDS) was conducted with NEB's in-house cultures of *M. bahia* (test dates: 5-7 August 2010). The 48-h LC_{50} for *M. bahia* was 17.7 mg/L SDS (95% confidence limits of 16.8 to 18.6 mg/L SDS; trimmed Spearman-Karber method) indicating that the health of the test organisms was satisfactory. Copies of the raw data sheets and the statistical summary for the SDS test are located in Appendix A.

If you have any questions concerning the acute toxicity test results, please contact me at (860) 643-9560.

Sincerely,

Robin T. Faulk
Assistant Laboratory Director

TABLE 3.

SUMMARY OF *Mysidopsis bahia* STATIC-ACUTE TOXICITY TEST RESULTS PERFORMED ON A SAMPLE FROM TANK NO. 140 - OUTFALL 001A

NEB Test ID No.	Test Species	LC_{50} (% effluent)	A-NOEC (% effluent)	Control Survival (%) ASW[a]	Control Survival (%) DIL[b]
Tank #140 First Rainfall (Test Dates: 6-8 August 2010)					
30-1990	*M. bahia*	24 h: > 100%	-----	98%	100%
		48-h: > 100%	100%	98%	100%

[a] ASW: Artificial salt water used as laboratory water control.
[b] DIL: Test dilution and control water (diluent) was natural salt water obtained from Narragansett Bay (Narragansett, RI).

TABLE 4.

***Mysidopsis bahia* DAILY SURVIVAL RESULTS FOR A STATIC-ACUTE TOXICITY TEST PERFORMED ON A TANK 140 FIRST RAINFALL SAMPLE – OUTFALL 001A COLLECTED ON 5 AUGUST 2010 (TEST DATES: 6-8 AUGUST 2010; TEST ID NO. 30-1990)**

Test Concentration	Survival % 24 h	Survival % 48 h	Dissolved Oxygen (mg/L)	Temperature (°C)	PH (SU)	Salinity (ppt)
ASW Control	98	98	5.7-7.1	24.5-24.8	8.1-8.2	24
DIL Control	100	100	5.6-7.3	24.8-25.0	7.9	25
6.25% effluent	100	100	5.6-7.2	24.8-24.9	7.8-8.0	25
12.5% effluent	100	100	5.6-7.2	24.7-24.9	7.8-8.1	25
25% effluent	100	100	5.6-7.1	24.6-24.9	7.8-8.2	24
50% effluent	100	100	5.5-7.0	24.7-24.9	7.8-8.3	24
100% effluent	95	90	5.5-6.8	24.5-24.9	7.8-8.4	24
Test Range:			**5.5-7.3**	**24.5-25.0**	**7.8-8.4**	**24-25**